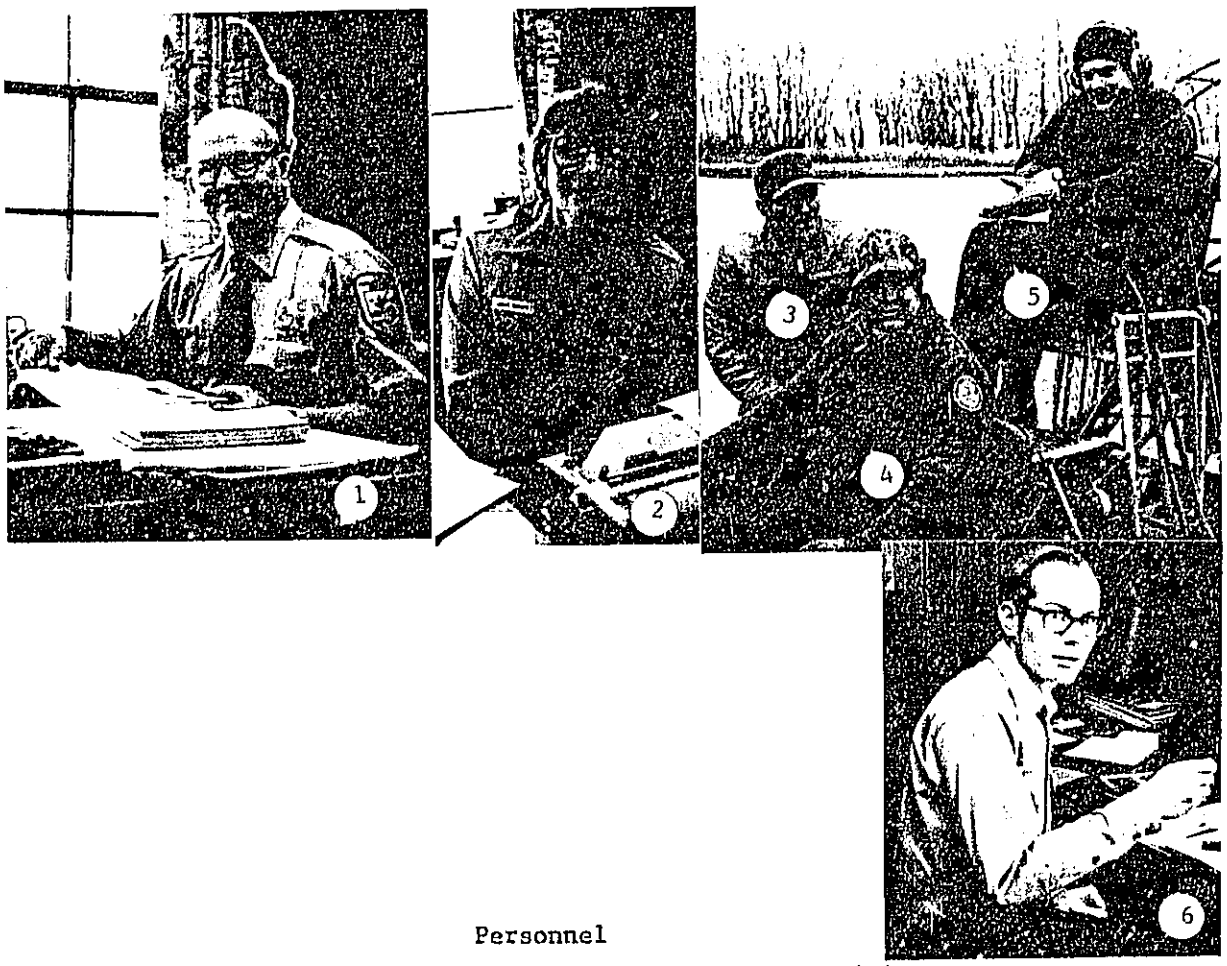
1979

SWAN LAKE NATIONAL WILDLIFE REFUGE
Sumner, Missouri

ANNUAL NARRATIVE REPORT
Calendar Year 1979

NATIONAL WILDLIFE REFUGE SYSTEM
Fish and Wildlife Service
U.S. DEPARTMENT OF THE INTERIOR



Personnel

1.	Alfred O. Manke, Refuge Manager, GS-485-12, Permanent Full-time	8/8/71
2.	Janis A. Turner, Adm. Clerk(typing) GS-301-5, Career-Seasonal	7/19/76
3.	Bennie M. Hull, Bio. Tech., GS-404-7, Permanent Full-time	8/2/65
4.	Harold C. Milligan, Tractor Oper. WG-5705-6, Permanent Full-time	5/14/75
5.	Jerry D. Kuykendall, Asst. Refuge Mgr. GS-485-9, Permanent Full-time	1/19/78
6.	Edward R. Moyer, Outdoor Rec. Planner GS-023-5, Permanent Full-time	6/19/78
7.	Stuart L. Burnside, Tractor Oper. WG-5705-6, Full-time Furlough	4/7/72 - 10/7/79 (Furloughed)
8.	Ervin Windsor, Tractor Oper. WG-5705-6, Full-time Furlough	9/28/52 - 10/7/79 (Furloughed) 12/29/79 (Retired)

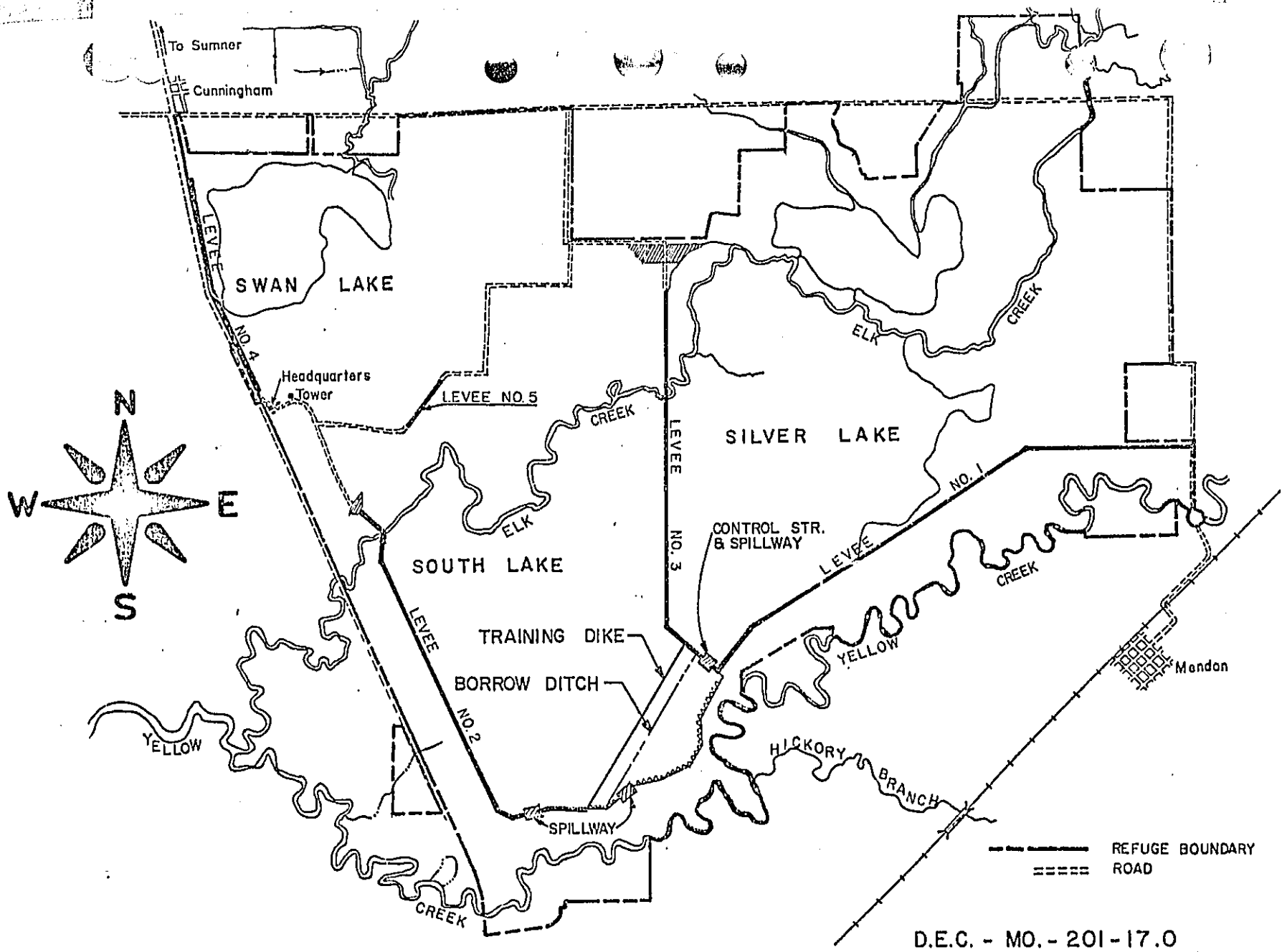
Review and Approvals

Alfred O. Manke 2/15/80
Submitted by Date

Area Office 2-27-80
Date

Swan Lake NWR, Missouri
Refuge

Regional Office Date



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SWAN LAKE N.W.R.

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I. GENERAL

A. Introduction

Swan Lake National Wildlife Refuge is situated within Chariton County in north-central Missouri and occupies 10,670 acres in the bottomlands of the Grand River, Elk Creek, and Yellow Creek. This part of the State was characterized by gently rolling prairie, interrupted by many southerly flowing streams. Abandoned frame houses stand in mute testimony of an era before "agribusiness" when farming was more a way of life. Forest cover has typically been removed and now remains as second growth timber only along stream banks and the sides of adjacent hills. Much of this is now falling to bulldozers all around the refuge in an effort to squeeze every acre into production.

Refuge topography is flat with the exception of an area of rolling grassland on the east side. Recent archaeological investigation has documented five sites along the original eastern shoreline of Swan Lake and the artifacts recovered to date suggest that Indians hunted this area seasonally. White colonization began about a mile north in 1828. Over the next 100 years, wildlife populations decreased in response to the pressures of civilization; forests were cut, the prairie plowed, nearby lakes drained, and the land that is now refuge was settled. Much of it was marginal farmland subject to annual flooding, and attempts to drain and farm Swan Lake at the turn of this century were frustrated by floodwaters from the Grand River which periodically took out sections of railway track and its levee just west of the lake.

Shortly after the refuge was set aside in 1937, to preserve habitat for ducks and prairie chickens, CCC levee work created Silver and South Lakes and enlarged Swan Lake about four times to its present size. These shallow impoundments cover almost half of the refuge. Moist soil plants and some 2700 acres of cropland attract one of the largest single concentrations of Canada geese in North America and Swan Lake National Wildlife Refuge is the primary wintering area for the Eastern Prairie Population (EPP) whose numbers on the refuge have exceeded 100,000 every year since 1962. Lack of enough suitable habitat for prairie chickens on and around the refuge caused their extirpation from the area. Attempts to reintroduce them failed.

Our present goal is to produce about 125,000 bushels of grain for wildlife annually. This is about half of the total food requirements for a post-season population of around 200,000 Canada geese which winter within the surrounding 1400 square mile Swan Lake Zone. It can only be achieved by force account farming and then only if

Clouds over Swan Lake ERM

"Move Over" ERM

the crops are not flooded out. Total habitat diversity is enhanced by 1000 acres of the southern boundary along Yellow Creek which are set aside as a Research Natural Area to preserve mixed bottomland hardwoods with oxbow lakes. The remaining 1500 acres are covered by forest, permanent grass, or remnant prairie.

B. Climatic and Habitat Conditions

The year began with blizzard conditions. Many township roads required highloaders and bulldozers to clear the 6' drifts that had paralyzed the surrounding area. Temperatures were bitterly cold with morning lows of -15°. The refuge was completely frozen and all but 8000 Canada geese went south. The harsh weather of January continued throughout most of February. A warming trend the last week of the month brought geese and flooding to the refuge. March was very unstable with snow, rain, and fluctuating temperatures resulting in flood conditions. April weather was cool and damp with only three days of farming accomplished. Field conditions improved with the fair and cool weather of May. The farming operation began in earnest and by the end of the month the corn had sprouted and the cutworms were flourishing. A four-inch rain in June drown, or retarded, around 150 acres of corn and milo. Another result of the downpour was the delay in cultivation and hoeing of several fields. This delay resulted in vigorous growth of the giant foxtail. Growing conditions in July were excellent for corn and sorghum with hot and dry conditions. Moist soil vegetation in Swan Lake also grew quite well. July's hot and dry conditions continued into August. Corn and sorghum fields had progressed well, but winter hairy vetch that was planted in July suffered from a lack of moisture. September weather combined with that of July and August had brought drought conditions to the areas. Off refuge potholes and marsh areas were drying out rapidly. The refuge lakes were low but still contained adequate water for migration of waterfowl. Dry conditions continued throughout October with only .47" of rain falling. The cumulative rainfall totals for July-October were only 5.62", compared to 13.46" July-October of last year. The first frost occured October 5, five days ahead of schedule. November brought cold temperatures and ice. Dry conditions continued except for a 3.5" rain. The ground was so dry virtually no run-off occured, and the lakes remained 24" below normal levels. December was mild, with temperatures in the 20's and low 30's. Therefore, the lakes remained ice covered.

In review, the first six months were colder and wetter than normal, while the last six months we experienced normal temperatures and drought conditions. The year ended with 23" of recorded moisture, 15" less than normal.

C. Land Acquisition

1. Fee Title

None.

2. Easements

Not applicable.

D. System Status

1. Objectives

The primary objective of Swan Lake National Wildlife Refuge is waterfowl maintenance. The Eastern Prairie Population of Canada Geese Management Plan has set an objective for this refuge to produce 125,000 bushels of grain annually. This commitment is to help feed 200,000 plus Canada geese of the EPP that winter in the Swan Lake Zone. To meet this objective the refuge in fiscal year 1979, expended 369 man-days and $83,000 in the migratory bird cropland management program.

In the Interpretation and Recreation program, 160,000 activity hours were recorded in Wildlife Recreation and Interpretation.

The disparity between system objectives and refuge outputs increased. The objective level for waterfowl use-days at Swan Lake NWR is 27,500,000, but we only recorded 13,000,000. The objective level is realistic but an extremely poor hatch year reduced the fall flight and severe winter weather pushed the birds south, thereby reducing refuge outputs. a better survey of NWR-goose waterfowl might find you in line 403
The Interpretation and Recreation objectives need to be reevaluated. The objective level for Wildlife Recreation, Consumptive and Non-consumptive, and Interpretation is 374,000 activity hours. Outputs in these catagories for 1977 were 187,235 a.h.; 1978, 155,448 a.h.; and, in 1979, 159,191 a.h., all considerably less than the objective level. Analysis of future needs and demands should be reviewed and objectives aligned with this information.

2. Funding

There were two projects funded in 1979, under BLHP, neither was accomplished. The contract for the much needed Office/ Visitor Contact Station should be let in the spring of 1980.

Focal species of the refuge. ERM

The other BLHP project was to upgrade visitor facilities on this refuge. This project was eliminated and the funding was added to the Office/Visitor Contact Station construction budget.

Subactivity	Planning Allowance 1976	1977	1978	1979
1110	-	-	$ 400	$ 300
1210	$119,000	$127,653	$157,200	$177,000
Rehab	-	$ 53,000	-	-
1220	$ 1000	$ 1000	$ 1000	-
1230	$ 4000	$ 1000	$ 500	$ 1500
1240	$ 13,500	$ 26,200	$ 33,200	$ 35,000
1400	$ 250	$ 300	-	-
Total	$137,750	$212,153	$192,300	$213,800

Manpower is shown on Personnel page.

II. CONSTRUCTION AND MAINTENANCE

A. Construction

No major construction was accomplished this year. However, administrative requirements such as E.A.'s, 404's, planning, and archaeological surveys have begun for 1980 projects. These projects include a new Office/Visitor Contact Station, flood damage repair work, and a flood protection levee.

B. Maintenance

Three new iron entrance gates were designed, fabricated, and installed by the refuge maintenance staff. Prior to these new gates we had been using regular livestock gates. One evening a "gentleman" backed his pickup up to one and wrapped a chain around it, then took off! Scratch one gate. The support posts for the new gates are 6" iron well casing buried in 6' of concrete with 4" iron well casing as the barrier, a worthy opponent for any vandal.

Some 150 tons of riprap were placed along washouts on Levee 3. Another 1000 tons will be purchased when the money is available.

Quarters 3 was insulated, resided with vinyl siding, and reroofed.

The screened front porch was repaired and painted on Quarters 13.

A new, larger, and wider garage door was installed in the equipment shed. This will permit farm equipment passage into the shed, where repairs can now be made during inclement weather.

Three, new 18' Massey-Ferguson disk harrows were purchased with $6,000 revolving rehab money. The maintenance crew was well pleased with these purchases.

C. Wildfire

No wildfires occurred on the refuge.

III. HABITAT MANAGEMENT

A. Croplands

The Swan Lake NWR farming program experienced a major change this year. Conventional farming techniques, such as inorganic fertilizers and pesticides are out and biological farming is in. Our purpose for entering this program was varied. Major considerations were the elimination of costly pesticides and fertilizers, improvement of the soil, and the raising of a more nutritional food grain for waterfowl.

Many of the practices we are incorporating in our cropland management are old, but we have included some modern biological farming techniques.

Our cropland management consists of a four-year crop rotation. The first year is corn, then milo, followed by winter wheat, and concluding the cycle is clover. Additionally, the following practices will also be included. After the last cultivation of the milo and corn, hairy winter vetch will be interseeded. The vetch will add nitrogen and organic matter to the soil. Also at this time, the row crops will be foliar fed with a fish concentrate sprayed directly on the plant. This will add nitrogen to the plant. On the wheat fields humates will be applied. Humates are a low grade carbon compound, somewhat like coal dust. When applied to the soil they form humic acid and accelerate the process of forming organic matter in the soil. The final practice we have included is the use of livestock manure on our fields. We have not started this operation yet, but when the funding is available, possibly FY-82, a large manure spreader will be purchased.

In 1979, we began implementing the rotation on some of our fields. We eliminated all pesticides from our program also. Table I, below, indicates acreage and treatment in 1979.

Table I

Crop and Treatment	Acreage
Corn w/NPK[1]	490
Corn w/NPK and Vetch[2]	64
Corn w/Fish[3] and Vetch	45
Sorghum w/NPK	11
Sorghum w/Fish	109
Sorghum w/Vetch	345
Sorghum	133
Wheat	410
Wheat w/Humates[4]	167
Clover (80% sweet, 20% alsike)	161
Total	1935

1 100 lbs. N - 20 lbs P - 100 lbs. K
2 Hairy winter vetch interseeded last cultivation
3 Fish concentrate sprayed directly on plant
4 Carbon compound, forms humic acid

The farming operation began in April when 160 acres were aerially seeded with clover. A mixture of 80% sweetclover and 20% alsike clover were applied at a rate of 20 pounds/acre. Wet weather delayed the row crop operation until May. By the middle of June, 599 acres of corn and 598 acres of milo had been planted. Approximately 100 acres of the corn were severely damaged by cutworms and were replanted. With the banishment of herbicides most of June and July was spent hoeing and cultivating. The giant foxtail was a real problem. The vetch was seeded and the fish concentrate was applied in July. During August the wheat ground was prepared and 410 acres of wheat were seeded. In September the humates finally arrived and another 160 acres of wheat were put in.

The corn yield was 48,000 bushels, the milo yield was 60,000 bushels, for a total grain yield of 108,000 bushels. In terms of waterfowl this provided enough food for 12,960,000 goose use-days.

The results of our first year of biologically farming were good. The yield differences, soil health, cost effectiveness, weed control, etc., will take several years of data collection for an adequate analysis. We believe that we are on the right track with this type of farming. Our techniques are not perfected, but with any new program this is to be expected.

Jerry "rollin' in clover". DAG

"Organically grown foxtail" JDK

The Missouri Department of Conservation planted 780 acres of winter wheat in the public hunting area on the refuge. This wheat is used for goose browse.

We had one permittee farming on the refuge in 1979. He planted 63 acres of corn and 31 acres of winter wheat. Our share was 20% of the corn and all of the wheat.

B. Grasslands

State personnel mowed 350 acres of grasslands in the public hunting areas.

Refuge personnel maintained a fire break around 300 acres of native grasses. This area was control burned in April to retard invading woody vegetation and to stimulate the native grasses. The big and little bluestems, Indian grass, and switch grass responded well to the burn.

C. Wetlands

The wetlands management consisted of spring draw downs to produce moist soil foods and flooding in the fall for waterfowl use.

Swan Lake, 900 acres, and South Pool 900 acres, are drawn down in May to produce smartweed and millet. In September the valves on Silver Lake, 2100 acres, are opened and the water is channelized to Swan Lake and South Pool, flooding the moist soil plants.

Increased siltation of our pools has reduced the quality of our wetlands. Black willows and bulrushes have invaded the shallower areas of the pools, decreasing the moist soil production.

The Soil Conservation Service began a study, in October, to determine how much silt has been deposited here and at what rate. The solution to our silt problem is twofold; educate the farmers upstream that fall plowing is destroying their land and the building of a desilting basin in Silver Lake. Hopefully both will be accomplished, otherwise we will be farming Silver Lake in the near future.

D. Forestlands

Nothing to report.

E. Other Habitat

Nothing to report.

F. Wilderness and Special Areas

About 1000 acres of bottomland timber have been designated as a Research Natural Area.

G. Easements for Waterfowl Management

Not applicable.

IV. WILDLIFE

A. Endangered and/or Threatened Species

The bald eagle is the only nationally listed endangered species found on Swan Lake NWR. Eagles use the refuge for feeding, loafing, and roosting. They begin arriving in October, peak in December-January, and then return north in March-April. In the winter the eagles feed on goose carcasses, while in the spring, after the thaw, winter-killed fish become an important part of their diet. Wintering eagle numbers on the refuge are directly related to the goose population. (see Figure I and Figure II)

This year the bald eagle population peaked at 181, in December. Of this, 92 were immatures and 89 were adults. In 1978, the peak population occured in December with 82 immatures and 46 adults.

The following wildlife found on the refuge are on Missouri's endangered species list: marsh hawk, sharp-shinned hawk, Cooper's hawk, king rail, upland sandpiper, least tern, osprey, smooth green snake, and long tailed weasel.

B. Migratory Birds

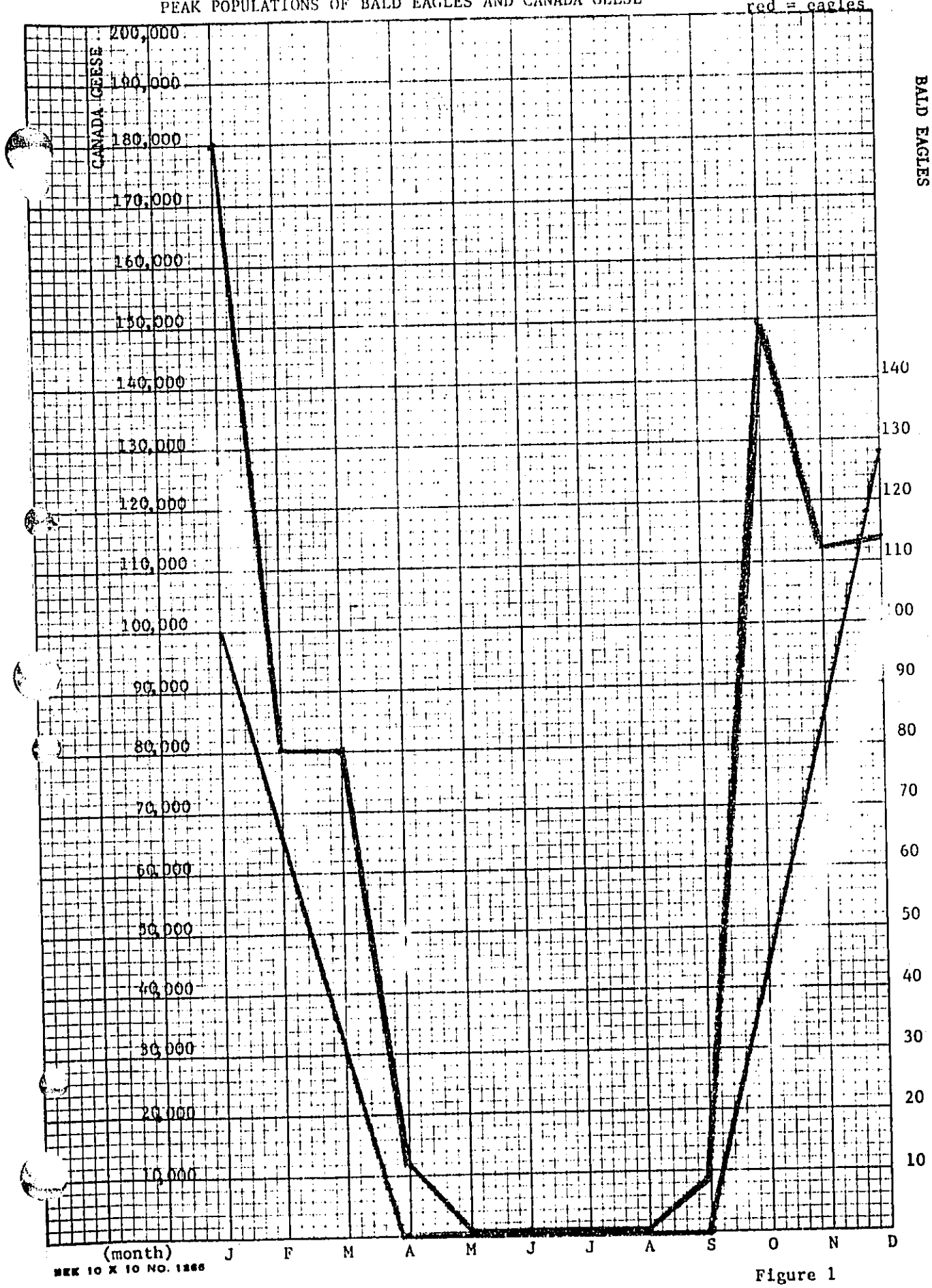
1. Waterfowl

It was another difficult year for the Eastern Prairie Population of Canada geese. In January the peak population on the refuge was 21,800. Extremely bitter cold and deep snows pushed over a 100,000 birds south to southern Missouri, Arkansas, and Louisiana. The warming trends of February brought the geese back and on the 25th we had 75,000 on the refuge. This was the peak winter population. The fall migration began with birds arriving in September with a peak fall population of 130,000 birds.

1978

PEAK POPULATIONS OF BALD EAGLES AND CANADA GEESE

blue=Canada geese
red = eagles



KEUFFEL & ESSER CO. MADE IN U.S.A.
KEK 10 X 10 NO. 1366

Figure 1

1979

PEAK POPULATIONS OF BALD EAGLES AND CANADA GEESE

blue=Canada geese
red = eagles

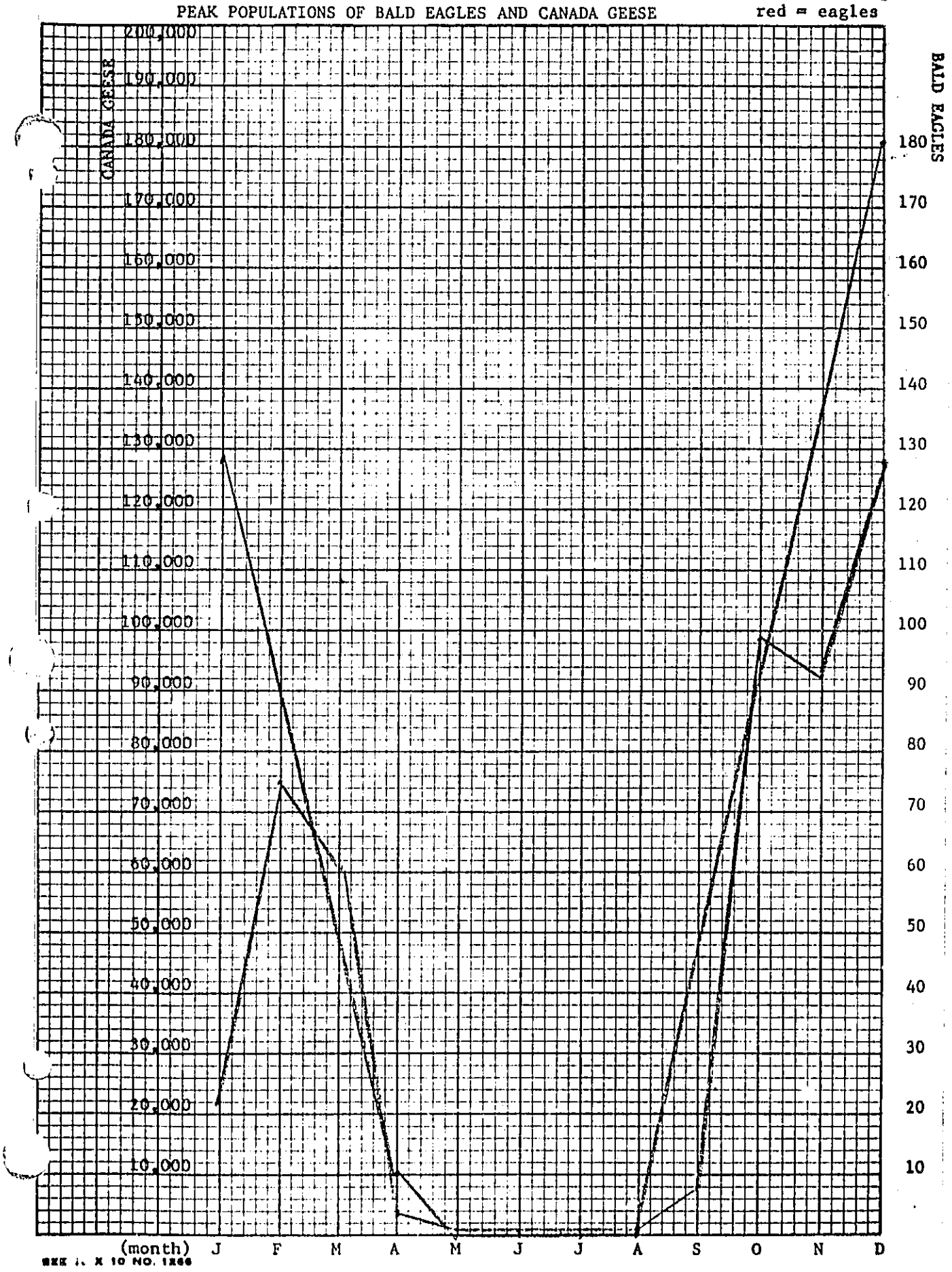


Figure 2

The EPP has declined in numbers for two successive years. The management plan outlines objectives so there are 200,000 geese left after the hunting season. The fall flight peaked at 130,000 birds, 70,000 short of this objective. Poor productivity, because of bad weather for two years has attributed to this decline. Comparison of the immature/adult ratio data from banding operations in pre-hunting seasons 1977, 1978, and 1979, indicates poor nesting success. Pre-season 1977 the I/A ratio was .47, in 1978 .21, and in 1979 .24. The immature/adult ratio of geese checked in by hunters also indicated poor nesting success, as shown in Table II below.

Table II

Year	Immature/Adult Ratio
1973	2.63
1974	2.01
1975	3.29
1976	2.11
1977	1.76
1978	.80
1979	1.70

The hunting season for waterfowl in the Swan Lake Zone began October 24, and ended January 1, 1980. A total of 11,563 hunters utilized the refuge public hunting area, killing 3555 Canada geese for an average kill per hunter of .49. The Zone harvest was 16,997 geese, the harvest quota was 25,000. Hunting success on refuge was good; off refuge fair-to-poor. Hunting pressure on refuge was high; off refuge was low.

Preseason and post-season banding quotas were met. In the post-season a total of 2044 Canada geese were banded, 517 immatures and 1526 adults. In the fall, 2087 geese were banded pre-season, 456 immatures and 1631 adults. In both pre-season and post-season, the quotas have called for 500 immatures to be banded, or 2000 geese total, whichever came first.

This year we also had a wood duck banding quota of 100 wood ducks of each age and sex. After countless man-hours of pre-baiting, trap repair, baiting, running traps, etc., we banded 31 wood ducks. The problems we encountered were low population densities and poor trap selection. We used swim in brood traps, with little success. In 1980, we are going to locate roost sites, if they are here, and will try rocket netting.

"Not another muskrat" EPM

"All that work for one duck" EPM

The snow/blue goose peaked at 50,000 during the spring migration. Spring duck populations were normal, for example during the week March 13-22, there were:

blue-winged teal	100	shoveler	25
scaup	2000	redheads	100
ring-necked	2000	black duck	12
mallard	2500	common goldeneye	100
wigeon	100	bufflehead	25
canvasback	2000	ruddy duck	25
pintail	100	common merganser	25
		hooded merganser	25

In the fall, mallard, pintail, and teal were numerous. Mallards peaked at 27,000 in November, pintail 7500 in October, and 20,000 teal in September.

2. Marsh and Water Birds

During the spring and summer months a diversity of water and marsh birds can be observed throughout the refuge. Commonly encountered species are white pelicans, great blue herons, great egrets, snowy egrets, and cattle egrets. Less numerous but consistently seen are American bitterns, double crested cormorants, and sora rails.

The white pelican population peaked in the fall with 1500 birds. Heron and egret numbers were around 100 of each species at their peak.

3. Shorebirds, Gulls, Terns and Allied Species

Low water levels and exposed mud flats provided favorable habitat for shorebirds this year. Common species seen were greater yellowlegs, killdeer, black terns, common snipe, ring-billed gull, Bonaparte's gull, and several sandpiper species.

4. Raptors

Raptor populations are quite high on Swan Lake, particularly during periods of waterfowl concentrations. Marsh, rough-legged, and red-tailed hawks are the most numerous raptors in the area. In December, the peak populations of hawks occurred with 25 marsh hawks, 50 red-tailed hawks, and 50 rough-legged hawks.

5. Other Migratory Birds

Large flocks of grackles and red-winged blackbirds are common in this area. In November we estimated over 1,000,000 blackbirds roosting in the Yellow Creek bottom on the refuge.

The mourning dove population peaked at 5000, in August. There is a considerable amount of dove nesting on the refuge.

C. Mammals and Non-Migratory Birds and Others

1. Game Mammals

White-tailed deer, cottontail rabbits, squirrels, and raccoons are classified as game mammals in Missouri. None of these may be hunted on this refuge.

During the late fall and winter months the deer herd increases. It is common to see upwards to a 100 deer feeding in the evening in a 40-acre wheat field. We estimated a peak population of 500 deer.

The squirrel and raccoon populations are excellent. The bottomland timber of the Yellow Creek area has a tremendous gray and fox squirrel population.

Hunting pressure for deer and raccoon is intense off the area. Raccoon pelts sold for $45 this year. Hunter ethics were as low as prices were high.

2. Other Mammals

Muskrat populations increased on refuge this year. Along a one and one-half mile stretch of shoreline, 88 rat houses were counted. Beaver activity is abundant in all of the lakes. We have been well pleased with their appetite for black willow. We censused coyotes using siren elicited responses. With the data derived from this we estimated a population of 50 coyotes.

3. Resident Birds

Turkeys reside on the refuge in small numbers. A flock of 10 was observed on South Pool in December. The quail population appears healthy after a two year decline.

Just finished banding the last of 2044 geese. JAT

"Rocky" raccoon. ERM

4. Other Animal Life

A winter fish kill occurred this year in South Pool, but spring floods restored our fisheries with the ever locally popular carp and buffalo.

V. INTERPRETATION AND RECREATION

A. Information and Interpretation

1. On-Refuge

The Habitat Trail, our three-fourths mile self-guided interpretive loop, was opened on August 1, and is the only interpretive facility on the refuge. We had a trail leaflet printed locally to see us through the main public use season. Based upon the number of leaflets taken and actual head counts, 1021 visitors walked this trail before it had to be closed for the Canada goose hunting season which began on October 24.

Our Open House is traditionally held on the Sunday prior to goose hunting. Since gasoline had reached almost a dollar a gallon by October 21, and half of the stations were closed on Sunday, there were fewer out of State vehicles this year. We had 5200 people; only 47% of the 1978 level of visitation. A special auto tour leaflet was again printed for the occasion.

Outdoor Recreation Planner Moyer and a YACC enrollee assisted the Missouri Department of Conservation's naturalists during the first annual Eagle Day at Swan Lake NWR, one of three held in Missouri. A total of 402 people preregistered for our first attempt on January 14. This was snowed out and rescheduled for February 4. The weather that day was crystal clear and cold. A total of 285 people showed up and all saw at least one eagle. Over half had never seen an eagle in the wild before.

Questionaires were distributed by the State to each participant and 32.4% of the participants rated Eagle Day as "one of the most enjoyable wildlife viewing days ever experienced", and 63.8% rated it "very enjoyable".

All indoor aspects of the program were held at the Swan Lake State Hunting Headquarters where exhibits and handouts were available and films shown throughout the day. Two, 20-passenger State buses and two, 10-passenger YACC vans were driven over a circular route through the interior of the refuge. Stops were

YCC's finishing the Habitat Trail. ERH

made at various points to set up spotting scopes which permitted visitors to view eagles without disturbing them appreciably.

Three-fourths of our conducted tours were given in October, prior to the goose hunting season. The refuge staff gave 22 conducted tours to approximately 850 people.

We again borrowed the Denver Regional Office's 3-M sound-on-slide projector and programmed it for use at the Swan Lake State Hunting Headquarters. This program interpreted our responsibility toward eagles as endangered species, our concern about their plight, and our perception of hunter responsibilities while they were on the refuge. We combined this program with one on steel shot and Canada goose trapping so that the projector could be used as a verbal message repeater. It operated flawlessly over the 70-day goose hunting season and helped us reach over 11,000 hunters. The eagle section was reinforced by stapling locally printed eagle posters into each of the 60 goose pits on the refuge.

Environmental Education, according to Service definition, involved just six teachers and 140 students during the year.

2. Off-Refuge

International Year of the Child. Two contests were targeted at the 28 public and parochial elementary schools in the four-county area surrounding Swan Lake NWR. The First thru Third grades were asked to do a poster of what they would expect to see on a national wildlife refuge. The Fourth thru Sixth grades were asked to submit essays of 250 words or less on the topic "What a National Wildlife Refuge Means To Me". All schools were contacted in April and October, and we had a combined response from 25% of them. A total of 25 winners was picked and each received Wildlife Portrait Series #3, by Bob Hines.

Civilian Conservation Corps reunion. On July 15, the community of Sumner and the refuge staff held the first reunion for former members of Co. 1727 CCC. This company was assigned to build the refuge between 1937 and 1942. About 20 former corpsmen attended. After a picnic lunch at Sumner Community Park, a special tour was provided through the refuge for these men and their families. Outdoor Recreation Planner Moyer taped interviews and photographed about half of the men in an attempt to collect oral history which we hope to use later in our interpretive efforts.

Assistant Refuge Manager Kuykendall gave a Special Assembly at McCartan Memorial School where he showed a film and led a general discussion of wildlife values.

Refuge personnel handled 1120 public inquiries and issued 13 Golden Age Passports. Six news releases were sent to local papers. Banding operations were video-taped for the Kansas City Area Office.

B. Recreation

1. Wildlife Oriented

Fishing is permitted from March 1-September 30, daylight hours only, and in accordance with State and Federal regulations. Though the quality of fishing continues to decline due to siltation, warm water fishing accounts for slightly over one-fourth of the total refuge visitation. Most of our fishermen are locals and a great many are repeat visitors.

Geese are the only species which may be hunted on this refuge. Demand is high for the 60 blinds. A total of 13,606 applications were received for the 4060 available reservations. During 1979, there were 11,274 refuge hunters averaging about three to the blind. The season opened October 24, and lasted through January 1, 1980. All hunters with 12-gauge shotguns were required to shoot steel shot only, though lead was still permitted in other gauges. A maximum of ten shells per hunter was allowed. Blinds were well maintained and spaced, and hunter success was high. Refuge hunting has been administered under cooperative agreement with the Missouri Department of Conservation since 1955.

Wildlife observation accounted for over half of the 85,000 visitors. Canada geese are still the focal point of this refuge but we are experiencing a substantial reduction from previous years in the number of people coming to view them in the fall. Our total visitation of 15,123 for October 1979 was 36% less than that for October 1978.

2. Non-Wildlife Oriented

Nothing to report.

C. Enforcement

It was a very quiet year. During the 1979 waterfowl season, 24

citations were issued by Federal and State agents for violations. This is about half of the citations issued in 1978.

Cases filed in Magistrate Court, Chariton County:

Number		Fines	Court Cost
4	Changing blinds	$ 20	$ 88
3	Non-resident with resident permit	150	66
1	Taking protected species(wood duck)	10	22
1	Attempt to take over limit	100	11
1	Shooting at geese while out of blind	5	11
1	Possessing lead shot in non-toxic zone	10	22
1	Shooting over 10 shell limit	15	22
2	Trespass on refuge with gun	50	44
1	Taking overlimit Canada geese	$ 100	$ 22

Cases filed in U.S. District Court, St. Louis, Mo.:

9 Hunting migratory birds on baited area $ 550 . (1 pending)

Signing at hunter access points is inadequate and perhaps half of the people driving in and out of the Patrol Road on any given day should not. It is a difficult enforcement situation though, since refuge hunters are allowed to leave and then return to their blinds as often as they wish during the day.

Under existing policy, it is common practice to retrieve geese for those hunters on private property whose birds fall on the refuge. While this may keep some hunters from climbing the fences to recover their geese, it probably encourages many to shoot over our boundary. Some reduces the crippled/unretrieved geese to.

There is a time-space conflict between the hunting and I&R programs. The Habitat Trail and Environmental Study Area are located just inside our main entrance, on the northwest corner of Swan Lake. They must be closed prior to the opening day of hunting to ensure visitor safety, as two refuge blinds are located in this area. Access by the general public and school groups then is restricted to the main entrance road and the Observation Tower. This severely limits the refuge's capacity to be used as a resource base for interpretive and educational experiences.

VI. OTHER ITEMS

A. Field Investigations

This year saw the completion of Mr. Richard Kahl's study "Crop Depredation by Waterfowl in North Central Missouri", which

was initiated in 1977. The study's total estimated cost of $26,200 was partially financed by two Service grants amounting to $9800.

Most depredations in this area are by Canada geese grazing on green winter wheat. Mr. Kahl's final objectives were to determine whether geese grazing on wheat reduced grain and forage yields; and, the effects of seasonal food preferences, availability, and feeding flock dispersal have on depredations. Mr. Kahl's study concluded that wheat grain yield was reduced when grazed on in the early fall, jointing wheat in late spring, and during wet field conditions. Trampling by geese, especially during wet weather, has been claimed to be one of the most important causes of winter wheat crop losses. Variable trampling, even during very wet conditions at Swan Lake NWR, did not significantly affect yield and a considerable amount of plant material had to be removed before damage occurred. The extent of damage depended upon the growth stage, soil moisture and type, and not the number of goose-use days. The degree of damages cannot be assessed at the time of grazing, and wheat damage must be assessed at or just prior to harvest. Fall weather is the major factor that determines available foods, and the number of depredations. Wet falls delay harvesting of crops and fall plowing. Consequently, the unharvested crops are vulnerable and without fall plowing waste grain is available. Wet fall weather also prevents wheat planting and eliminates the greatest source of depredations complaints in this area.

A Sediment Survey was begun this year. The U.S. Department of Agriculture, Soil Conservation Service, Columbia, Missouri, issued a contract to AESCO Oceanographic, Arlington, Virginia, to survey Swan Lake, Silver Lake, South Lake (on this refuge), and three Pools located on the State of Missouri Fountain Grove Wildlife Management Area. The purpose of the study is to determine the rates of sediment deposition in our three lakes.

Phase I of this study involves field surveys and the actual collection of sediment samples at 200' intervals along three ranges in each lake. Additional cores will be taken at selected locations for Cesium-137 analysis. Soundings will be taken at 50' intervals along each range and also soundings taken perpendicularly to these ranges in a grid pattern to provide a more accurate topographic profile. The sediment cores are being taken to impenetrable depths, or 9', and in situ densities will be measured at sediment core locations. Two cores are being taken at all locations. AESCO will analyze one core to determine the inorganic and organic content of selected layers while SCS will analyze the other core.

Phase II of the survey involves the determination of accumulated sediment, sediment rates, remaining storage and a summary report.

Archaeologist Robert T. Bray conducted a Cultural Resources Survey of the sites of new construction for our new Office/ Visitor Contact Station, parking lot, and electrical and sewer-water lines trench. The inspection revealed only one site and it was a late 19th century house. Documentary sources failed to indicate any historical significance for the house, but avoidance of the site is built into the construction plans. The proposed construction project is approved as having "no effect" upon cultural resources.

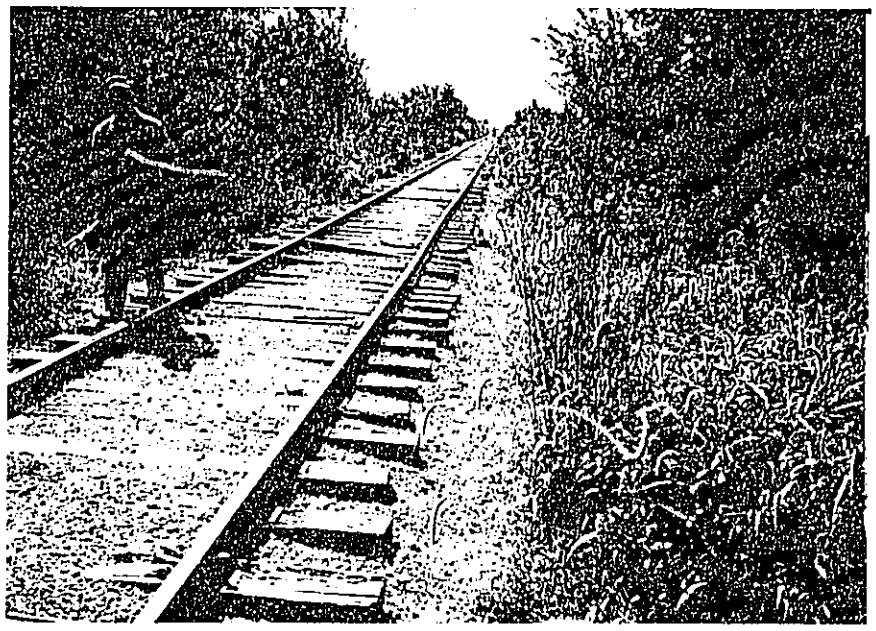
Mr. Bray conducted another archaeological survey of our proposed DLHP Project #5. Five sites were located that could possibly contain Indian artifacts. These sites will have to be revisited when the weather permits and we have prepared the soil for further investigation. After the archaeological survey is completed, the Denver Regional Engineers will survey and stake the area. This project may be delayed a year and may not be completed at all.

The refuge staff again participated in a large scale dove nesting study which was designed to determine what effects September hunting has on late nesting. Nest searches and monitorings were conducted in eight, 2000-acre plots scattered across northern Missouri, ten miles south of the Iowa border. These plots were paired with similar ones in Iowa. Iowa does not have dove hunting but Missouri does. This was the second year of a three-year study.

B. Cooperative Programs

This was the fourth year of our non-resident YCC program. We had 20 enrollees from eight different towns and a staff of four. Mr. Ken Dudley capably served as Camp Director for his third season. The camp was shortened from eight to six weeks because of financial restrictions but the enrollees did an impressive amount of work.

YCC projects included posting and fencing about two miles of boundary, erecting a storage building, building a loading dock, repainting and staining many structures, and lots of general cleanup. They helped with wood duck trapping and banding. Environmental awareness was designed into other projects like building blue bird houses, rescuing channel catfish from a drying pool, and constructing a three-fourths mile long Habitat Trail. Clearing, cut and fill, hauling wood chips, and placing signs for this project alone totaled more than 1200 man-hours. We are especially proud of the way the Habitat Trail turned out.



Dove nest search. "Looking for them" ERM

Dove nest search. "Finding one" ERM

The YACC program began the year with two work leaders and 11 enrollees. In February, one work leader was fired and the other work leader and two enrollees quit, in protest of this action. Temporary work leaders assigned from Mingo YACC kept the camp going until a permanent leader, Kent Chronister, arrived in March. The enrollees painted the shop, cut brush and willows from Silver Lake levee, transplanted 30 hybrid chestnut trees, and planted about 300 seedlings. About 40 large trees killed in 1978 by the "Tordon Terror" were removed along our roadside to ensure visitor safety.

In June, Kent Chronister was RIFFED and tools and equipment not required by the few remaining enrollees were returned to Mingo YACC. Normal attrition took the rest of the YACC enrollees by September.

In October, we hired four new enrollees, two men and two women, which were under our supervision. Due to financial restrictions no work leaders were hired. These four new enrollees manned the goose check station for the entire 70-day goose hunting season and performed general cleanup and vehicle maintenance.

C. Items of Interest

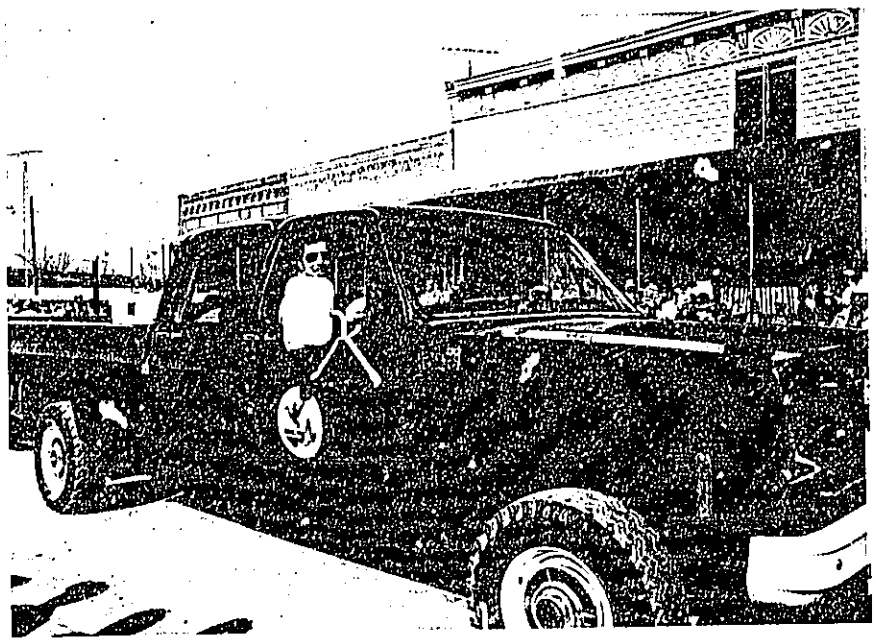
In February, Refuge Manager Manke attended a three-day Project Leaders meeting at the Kansas City Area Office and then participated in a Biological Farming Workshop held at DeSoto NWR along with Assistant Refuge Manager Kuykendall, Biological Technician Hull, and Tractor Operator Milligan.

Outdoor Recreation Planner Moyer attended the Refuge Academy in February-March. ARM Kuykendall returned from four weeks Law Enforcement training at Glynco, Ga., in May and went to the ground-breaking ceremony for their Visitor Center at DeSoto NWR with RM Manke. In May RM Manke and ORP Moyer attended a meeting at KCAO to discuss display themes for our new Office/Visitor Contact Station, and ORP also attended a two-day Law Enforcement mini-course at Big Lake State Park.

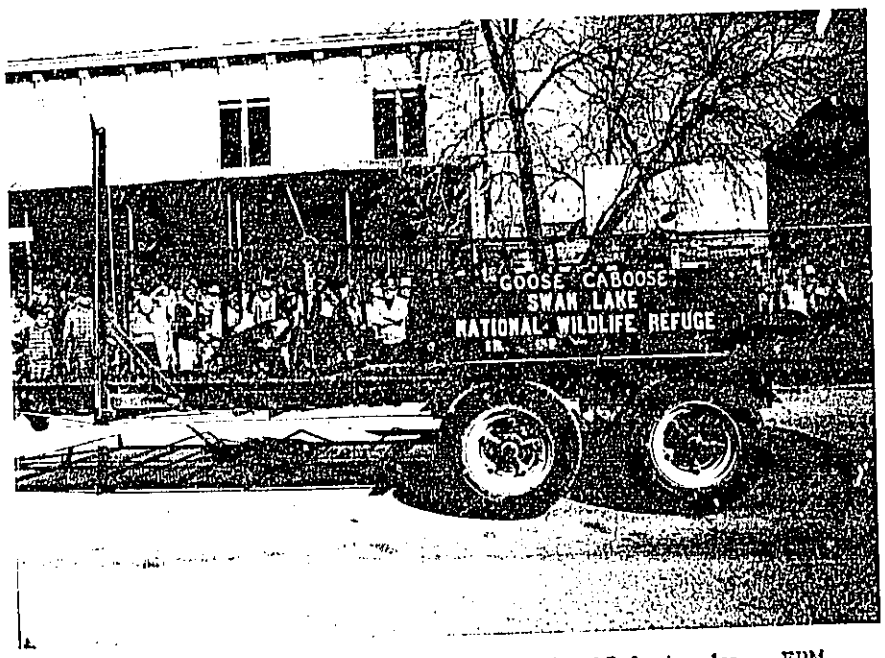
In June, ARM Kuykendall held a YCC Open House and was also promoted to GS-9. RM Manke and ORP Moyer attended a "Planned Communications" workshop in Denver.

In August, RM Manke, ARM Kuykendall, and Clerk Turner went to a three-day Leaders-Clerks meeting in the KCAO. ORP Moyer went to a Regional AIN meeting in October.

We finished the year with the refuge manager going to the Midwest Wildlife Conference in Champaign, Illinois, and Tractor Operator Ervin Windsor retired after more than 30 years of



Sumner's Wild Goose Festival Parade 25th Anniv. ERM



Sumner's Wild Goose Festival Parade 25th Anniv. ERM

Government service, on December 29. Erv helped build the refuge in the late thirty's as a member of the CCC.

Narrative Report Credits:
Introduction, Interpretation and Recreation, Other Items - Outdoor Recreation Planner Moyer
Climatic and Habitat Conditions, System Status, Construction and Maintenance, Habitat Management, Wildlife - Assistant Refuge Manager Kuykendall
Typing, Editing, Correcting, Binding - Clerk Turner

D. Safety

No lost time accidents marred the year. It has been 5369 days since a lost time accident has occurred at this refuge.

All YCC enrollees and staff attended first aid training.

Monthly meeting covered such topics as electrical shock, good housekeeping, safe driving practices, and the fire potential of vehicles equipped with catalytic converters. Also discussed were the safe use of nylon tow ropes, grinders, proper techniques of using jumper cables, the need to orient all refuge employees to the use of heavy equipment in emergencies, and the potential hazards of butane lighters.

We have installed first aid kits in all vehicles and initiated routine vehicle inspections every 3000 miles or 90 days.

A film was shown at most meetings.